

An efficient method to generate a perturbed parameter ensemble of a fully coupled AOGCM without flux-adjustment – Supplementary material

Peter J Irvine¹, Lauren Gregoire², Dan J Lunt², Paul J Valdes²

[1] Institute for Advanced Sustainability Studies IASS, Potsdam

[2] School of Geographical Sciences, University of Bristol, UK

Correspondence to: peter.irvine@iass-potsdam.de

This supplement consists of 2 tables that list results and parameter values for each ensemble member. Supplementary table 1 lists the parameter values and the final equilibrium temperature after 800 years of pre-industrial simulation. Supplementary table 2 lists the performance of the ensemble members in the pre-industrial for a number of metrics.

Supplementary table 1. This table shows a list of the parameter values and global mean temperature values after 800 years of pre-industrial control run for the 21 accepted runs and the 6 failed runs (shown in gray). CW_LAND and CW_SEA are linked parameters that co-vary. The VDIFF parameter consists of two linked parameters: the initial diffusivity at the surface, KAPPA0_SI, and the rate of increase of diffusivity with depth, DKAPPA_DZ_SI.

Supplementary table 2. This table shows a comparison between the members of the ensemble and a combination of observations and the CMIP3 ensemble in the pre-industrial. Failed ensemble members are shown in grey and values outside of the range used for comparison are shown with bold text. Most comparisons are made with the ERA-40 1961 – 1990 mean and the CMIP3 ensemble (Meehl et al., 2007) but the temperature and overturning constraints are made against other observations (Jones et al., 1999, Brohan et al., 2006, Solomon et al., 2007, Rayner et al., 2011).

- BROHAN, P., KENNEDY, J. J., HARRIS, I., TETT, S. F. B. & JONES, P. D. 2006. Uncertainty estimates in regional and global observed temperature changes: A new data set from 1850. *Journal of Geophysical Research-Atmospheres*, 111.
- JONES, P. D., NEW, M., PARKER, D. E., MARTIN, S. & RIGOR, I. G. 1999. Surface air temperature and its changes over the past 150 years. *Reviews of Geophysics*, 37, 173-199.
- MEEHL, G. A., COVEY, C., DELWORTH, T., LATIF, M., MCAVANEY, B., MITCHELL, J. F. B., STOUFFER, R. J. & TAYLOR, K. E. 2007. The WCRP CMIP3 multimodel dataset - A new era in climate change research. *Bulletin of the American Meteorological Society*, 88, 1383-+.
- RAYNER, D., HIRSCHI, J. J. M., KANZOW, T., JOHNS, W. E., WRIGHT, P. G., FRAJKA-WILLIAMS, E., BRYDEN, H. L., MEINEN, C. S., BARINGER, M. O., MAROTZKE, J., BEAL, L. M. & CUNNINGHAM, S. A. 2011. Monitoring the Atlantic meridional overturning circulation. *Deep-Sea Research Part II-Topical Studies in Oceanography*, 58, 1744-1753.
- SOLOMON, S., QIN, D., MANNING, M., CHEN, Z., MARQUIS, M., AVERYT, K. B., TIGNOR, M. & MILLER, H. L. 2007. Climate Change 2007: The Physical Science Basis. In: S. SOLOMON, D. Q., M. MANNING, Z. CHEN, M. MARQUIS, K.B. AVERYT, M. TIGNOR, H.L. MILLER (ed.) *Climate*

Change 2007: The Physical Science Basis. Contribution of working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge: Cambridge University Press.